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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/554,317	10/24/2005	Masatoshi Iio	040356-0574	4554
22428 7590 11/30/2009 FOLEY AND LARDNER LLP SUITE 500 3000 K STREET NW WASHINGTON, DC 20007			EXAMINER CHUO, TONY SHENG HSIANG	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 11/30/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/554,317

Applicant(s)

IIO, MASATOSHI

Examiner

Tony Chuo

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/200)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

DETAILED ACTION

Response to Amendment/Arguments

1. Claims 25-49 are currently pending. Claims 1-24 are cancelled.

Applicant's arguments filed 8/10/09 have been fully considered but they are not persuasive.

The applicant argues that the present specification at page 12, lines 4-10 also teaches that the generated energy EDH2n of the fuel cell stack 1 is equivalent to the output power of the fuel cell stack 1. The applicant further argues that the generated energy EDH2n, of the fuel cell is equivalent to the output energy of the fuel cell stack and hence this value can be measured. For example, the generated energy EDH2n could be measured in a state where no purging is performed. The hydrogen partial pressure PH2n of the anode gas at the time of this measurement can be calculated from the measurement conditions. By plotting the pairs of EDH2n and PH2n, which show time-dependent variations, on a graph, a usable map corresponding to Figure 6 is easily obtained.

In response, the examiner disagrees that a usable map corresponding to Figure 6 is easily obtained by plotting the pairs of EDH2n and PH2n. The examiner agrees that there appears to be enough support for calculating the nitrogen partial pressure, PNN in the present specification. However, the specification does not disclose that the generated energy EDH2n of the fuel cell stack 1 is equivalent to the output power of the fuel cell stack 1 or that this value can be measured. The only description of the

generated energy EDH2n is found on page 12, lines 4-5, which states that "the controller 11 determines variation ΔEDH2n in the generated energy EDH2n of the fuel cell stack 1 caused by a reduction in the hydrogen partial pressure PH2n". Further, it is also unclear how the hydrogen partial pressure, PH2n, is calculated because the water vapor partial pressure, PWSn, is unknown since there is no explanation of how a qualitative value for the water vapor partial pressure PWSn is obtained using the graph of Figure 5 which also has no units.

The applicant further argues that one of ordinary skill in the art can generate a map through routine experimentation if provided with qualitative or relational information (e.g., the shape of a curve) between two parameters as shown in Figures 6 and 7.

In response, the examiner maintains the contention that one of ordinary skill in the art would not be able to generate a map through routine experimentation if provided with qualitative or relational information (e.g., the shape of a curve) between two parameters as shown in Figures 6 and 7 without knowing how to determine the water vapor partial pressure, PWSn, which is necessary for calculating the hydrogen partial pressure, PH2n. In addition, the operating conditions of the fuel cell, also unknown, would be necessary for one of ordinary skill in the art to generate a map through routine experimentation.

The applicant further argues that one of skill in the art can generate an approximation formula such as $y = Ax^2 + Bx + C$ from a shape of a curve showing a qualitative relation between two parameters x, y. By obtaining a couple of experimental

results (x_i, y_i) , one can determine the coefficients A, B, C. Such an approximation process is well known in the art.

In response, this argument appears to be based on the attorney's opinion and not based on any factual evidence. The examiner disagrees that such an approximation process is well known in the art.

Further, the applicant argues that the specification also provides details on how to determine unknown parameter by performing simple experiments using the fuel cell stack illustrated in Figure 1 and described at page 5, line 16 through page 7, line 15. Thus, a skilled artisan would be able to generate the maps of Figures 6 and 7 with ease given this information.

In response, the examiner disagrees that the specification also provides details on how to determine unknown parameter by performing simple experiments because there is insufficient detail in the specification on how to perform these "simple experiments" since none of the operating conditions of the fuel cell are disclosed.

Therefore, upon further consideration, claims 25-49 stand rejected under the following 112, 1st paragraph rejection.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 25-49 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The scope/breadth of the claimed subject matter includes a control method of "calculating a first energy loss caused by an increase in a non-hydrogen component in the anode gas while the purge valve is closed" and "calculating a second energy loss which corresponds to an amount of hydrogen lost from the anode gas when the purge valve is opened".

The nature of the claimed invention involves a method of removing impurity gases within the anode gas that is supplied to a fuel cell stack to enable an improvement in the power generating efficiency of a fuel cell system by setting the timing of such an impurity gas removal operation appropriately.

One skilled in the art at the time of the application would have known a method of removing impurity gases by purging the gas in the anode recirculation passage in accordance with a decrease in hydrogen concentration of the anode gas, an increase in the impurity gases concentration of the anode gas, or a decrease in the output of the fuel cell system.

The relative skill in the art would have included using sensors to determine the hydrogen gas concentration, impurity gases concentration, temperature, and pressure of the anode gas.

The information present in the current application, as originally filed, does not teach exactly how to make and use the claimed invention. The specification describes calculating a first energy loss by determining the variation ΔEDH_{2n} in the generated energy EDH_{2n} of the fuel cell stack 1 caused by a reduction in the hydrogen partial pressure PH_{2n} . The controller refers to a map having the characteristic shown in Figure 6, which defines the relationship between hydrogen partial pressure PH_{2n} and the generated energy EDH_{2n} , to determine ΔEDH_{2n} from the hydrogen partial pressure PH_{2n} calculated during execution of the current routine and a hydrogen partial pressure $PH_{2n,1}$ calculated during execution of the previous routine. However, there is no explanation on how this map of EDH_{2n} vs. PH_{2n} is determined, nor are there any units for the generated energy EDH_{2n} or hydrogen partial pressure PH_{2n} . Specifically, there is no explanation on what variables are measured, what mathematical formula or equation is used to calculate the generated energy EDH_{2n} , the fuel cell operating conditions that were used to generate the map, or the hydrogen partial pressure PH_{2n} shown in Figure 6. Similarly, the specification also describes calculating a second energy loss by using a map having the characteristics shown in Figure 7 which defines the relationship between a variation in the hydrogen energy EDP_n that is lost through purging, ΔEDP_n , and purging interval, t_n . Therefore, one skilled in the art would not be enabled to calculate the first energy loss and the second energy loss without additional guidance on how to determine the maps shown in Figures 6 and 7. Finally, one skilled in the art would not be able to make and use the claimed invention without undue experimentation. Without knowing the specifics on how to generate the

maps shown in Figures 6 and 7, one skilled in the art would require a considerable amount of experimentation that is not routine in the art.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795